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Characterizing the Estrogenic Potential of 1060 Environmental Chemicals by Assessing Growth Kinetics in T47D Cells

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In order to detect environmental chemicals that pose a risk of endocrine disruption, high-throughput screening (HTS) tests capable of testing thousands of environmental chemicals are needed. Alteration of estrogen signaling has been implicated in a variety of adverse health effects including cancer promotion, reproductive deficits, and vascular effects. Here we investigate the estrogenic potential of 1060 chemicals of environmental relevance using a real-time measure of growth kinetics by electrode impedance in the estrogen-responsive human ductal carcinoma, T47D cell line. Cells were treated in concentration response and measurements of cellular impedance were recorded every hour for six days. Progestens, androgens, and mineralocortocoids (progesterone, dihydrotestosterone, aldosterone) invoked a biphasic impedance signature that contrasted with the anticipated exponential impedance observed in response to known estrogen receptor agonists (17β-estradiol, genestein, bisphenol-A, nonylphenol, 4-tert-octylphenol). Several compounds, including bisphenol-A, and genestein caused impedance comparable to that of 17β-estradiol, although at much higher concentrations. Additionally, trenbolone and cyproterone acetate invoked the characteristic biphasic signature observed with other endogenous steroid hormones. The continuous real-time nature of this assay allows for the rapid detection of differential growth characteristics not easily detected by traditional cell proliferation assays. In conclusion, this assay shows potential, in combination with other ToxCast HTS assays, to detect environmental chemicals with potential endocrine activity.
This abstract does not necessarily reflect Agency policy.